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A KEY TO BRITISH HENLEAS.

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WHEN my brief paper on British Henleas appeared in the Zoologist' (1911, p. 464), it was impossible to foresee that in another year the number would be raised from eight to a score and a half, and that a key would be necessary in order to enable the student readily to distinguish one species from another. Aided by a Government grant, however, it has been possible for me to make many new discoveries in different parts of the country, and in this way greatly to extend our knowledge of this group of Enchytræids. Having during the past year given a somewhat full account of this genus in the 'Journal of the Royal Microscopical Society,' and in other journals enumerated in the Bibliography, it is not necessary to go over the same ground in detail. Since, however, several new species have been found since the principal of these articles was written, and some of these species have not yet been described, the key would be of little value without a few preliminary remarks.

The genus *Henlea* pertains to the Enchytræids, a family of Annelids belonging to the order Oligochæta. One of its chief characters is the forward position in which the dorsal vessel arises, usually from or near a bulbous swelling of the intestine, and the frequent presence of œsophageal glands in that locality. It now appears that the dorsal vessel often arises in or near the girdle, and it may be desirable eventually to separate the two groups into different genera. At present, however, it suffices to use this difference for purposes of classification within the genus.

Thus we have for our guidance the presence or absence of salivary glands, œsophageal glands, spermiducal glands, atrial glands, and the like; the shape of the brain, the point of origin of the dorsal vessel, the structure of the nephridia, the cœlomic corpuscles, the setæ, and other characteristics. After careful study of many hundreds of specimens from various parts of the country, it has gradually been borne in upon me that, while the setæ in the genus *Fridericia* are so constant that they can be absolutely depended upon as a species-character, the setæ in the Henleas are still in a fluctuating condition. In one and the same species they vary widely in number, and this applies to specimens collected at the same time in the same locality, as well as to those taken at intervals from different sites. Age and development have to be taken into account, and it is of the utmost importance that final diagnoses be based upon adults whenever possible.

In my former article (1)* eight species of *Henlea* were recorded as British, while a ninth was tentatively admitted in an Addendum. My next catalogue (2) contained no fewer than nineteen species, with the statement that "since this paper was written in May, 1912, one new species has been found by me in Ireland, making the twentieth British species." The description of the twentieth species duly appeared in the 'Irish Naturalist' (3) for January, 1913, the creature being named *Henlea glandulosa*, Friend. In the meantime further collections had been made in Derbyshire, Nottinghamshire, and elsewhere, with the result that other species apparently new to science were brought to light. Some of these, which were first found in Nottinghamshire, have been reported on in the 'Transactions of the Notts Nat. Hist. Soc.' (4). One has been named *H. mariona* on account of its resemblance to certain species of *Marionina*, which was formerly written *Mariona*. Others are very small, as the names *pusilla*, *parva*, *minuta*, and the like are intended to imply. In two or three species we find four pairs of septal glands, and in one case there are three setæ in each bundle throughout, for which reason it is named *H. trisetosa*.

In order that the key may be as complete as possible, it is necessary to add a brief description of those species which have

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* The numbers in brackets refer to the Bibliography.

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been discovered since my latest reports were published. A very careful revision of the whole of my material during the month of February showed that no fewer than twenty-nine species may now be regarded as British. *Henlea variata*, Friend, is proved to be the same in all essentials as *H. rhætica*, Bret., whose description must be extended to admit our native specimens. As no fewer than two out of every three of our indigenous species are destitute of œsophageal glands, it is proposed to divide the material into two groups, and retain the name *Henlea* for the one, adopting that of *Henleanella* for the other.

Subjoined are the descriptions of new species:—

1. HENLEA ALBA, sp. nov.

Length when alive 12–15 mm. Segments 50. Transparent, white. Three pairs of septal glands in the normal positions. Setæ 3–4 in the lateral, and 4–5 in the ventral bundles. Spermathecæ with ampulla or bulb midway between the two ends of the duct. No glands at the 4–5 opening. The normal salivary glands wanting, but a pair of nephridia-like bodies (or apparently three) between the second and third pair of septals. If these are œsophageal glands they are abnormal in position and appearance. Similar glands are found in *H. inusitata*, and Bretscher has drawn attention to a like anomaly in *H. gubleri*.

Girdle as usual extending over segment 12 to the setæ of 13. Cœlomic corpuscles of the brown, horny type so characteristic of several species of *Henlea*. Chloragogen cells large. The preclitellian nephridia found only in three segments, 8–9, 9–10, 10–11; but they often vary in number and position in different species. The dorsal vessel arises in the girdle, or in segment 13–14, where the intestine enlarges. No other species of *Henlea* has hitherto been found with the vessel in so backward a position, though it is frequent in *Enchytræus* and *Fridericia*. The œsophagus goes gradually into the intestine behind the last pair of septal glands, where the bulb usually occurs.

Collected at Netherhall, Bretby, Derbyshire, November 22nd, 1912, near an old tree-stump.

2. HENLEA INUSITATA, sp. nov.

Length 6–10 mm. Segments 30–35; white and transparent. Setæ 3-6 behind, 5–8 in front in the lateral bundles, sometimes from 6 to 9 in the ventral; shortest in the middle, as in *Fridericia*. Three pairs of septal glands normally disposed, the hindmost pair being different from the others. Between the second and third pair nephridia-like glands occur. They differ from those of *H. alba* described above, but apparently belong to the same class, though at present it is impossible to decide whether they are œsophageal or salivary glands. Their unusual character explains the specific name. Bulb in segment 8, and dorsal vessel in the intersegment 8–9. Girdle covering segment 12 to setæ of 13 with gland-cells recalling those of *Fridericia bulbosa*, Rosa. Brain slightly longer than broad, somewhat wider behind than in front; slightly concave when stretched; but straight or convex behind when at rest. Cœlomic corpuscles granulated, not horny or brown. Sperm funnel very small; no conspicuous atrial glands, penis or male pores. Spermathecæ consisting of a simple duct without distinct ampulla, bulb, or glands. Large blunt anteseptal, the whole nephridium resembling a leg of mutton.

Collected at Rolleston Junction, Notts, March 26th, 1912, in a heap of earth. Also found at Cauldwell, near Burton-on-Trent, June 11th, 1912.

3. Henlea minima, sp. nov.

Length 5–6 mm. Segments 25. Setæ 4–5 posteriorly, as many as six in front, growing smaller towards the centre of the bundle, as in *Fridericia*. But the Henleas vary in this matter a great deal. Three pairs of septals in normal position, small in front, medium, and large behind. No œsophageal glands; no salivaries; no nephridia-like glands between the septals. Brain similar to that of *H. inusitata*. Spermathecæ in the form of a tube, widest near the opening and narrowing towards the intestine. No ampulla, bulb or glands. Girdle extending as usual from segment 12 to setæ of 13. Cœlomic corpuscles large and clear, not horny; somewhat oval in shape. Intestine widens in segment 8, dorsal vessel arises in 10–11. Small anteseptal and large postseptal with duct as long as the latter, from whose mid-region it arises. Very fine sperm-duct opening into an atrial-gland in segment 12.

Collected with *H. alba* at Netherhall, between Bretby and Hartshorne, where I have taken *Rhyacodrilus* and other rare annelids, autumn, 1911; but hitherto regarded as a minor variety of one of the larger species.

4. Henlea multispinosa, sp. nov.

Formerly looked upon as a mere variety of *H. dicksoni*, which it somewhat closely resembles at first sight. A fairly stout worm, about 12 mm. in length, transparent, of 40 to 45 segments. Setæ from 4–6 behind, to 8 in the middle, and as many as 10–12 in front. Salivary glands present, resembling those of *F. bulbosa*, Rosa; slender and slightly forked at the tip. No œsophageal or nephridia-like glands. Spermathecæ composed of a duct which varies somewhat in size but has no distinct bulb or ampulla. Small glands sometimes occur at the 4–5 opening. Brain of the typical shape and size, slightly incised behind. Very prominent girdle when fully adult, with large pores. Nephridia with medium-sized anteseptal and large post, from about the middle of which a long duct emerges. Found nephridia as far forward as 4–5. Œsophagus enters bulbous intestine in segment 7, the dorsal vessel arising in the middle of the eighth. The normal septal glands (three pairs) present. Cœlomic corpuscles oval and granular, not brown or horny.

Found under moss by the canal at Nottingham, December 16th, 1912, and reported as a multispinose variety of *H. dicksoni.*

5. Henlea quadrupla, sp. nov.

Separated from *H. tenella*, with which I formerly associated it. *H. tenella* has never been satisfactorily worked out; but the species which I regard as approaching it most nearly is now found to be quite distinct from this, which is readily distinguished by the septal glands being quadrupled.

Length 6–10 mm. Segments up to 50 in number. Setæ 2–4 behind, 3–4 or 5 in front. One pair œsophageal glands in segment 8, large salivary glands filling up much of the cœlom in front of the first pair of septal glands. Nephridia with posterior ending in a narrowed duct. This form of nephridium is at present only recorded for one other species in this group; but in *Henleanella* at least four species (*H. marina*, *H. curiosa*, *H. parva*, and *H. rosai*) present it. Spermathecæ with short duct, large ampulla and glands. Brain of normal type. Dorsal vessel arising at the base of the pair of œsophageal-glands, *i. e.* in 8–9.

The Addendum to my article in the 'Zoologist' (1911, p. 468) refers to this species under the title *H. tenella.*

Found at Acresford, near Ashby-de-la-Zouch, November 28th, 1911, and the same week at Overseal, the adjoining parish. Also Netherhall, November 22nd, 1912, and Bretby, February, 1913.

6. HENLEA TRISETOSA, sp. nov.

A small worm, measuring about 5–6 mm., with 35–40 segments. Setæ sigmoid, 3 in each set throughout. Like the last it has 4 pairs of septal glands, but there are no œsophageals, so that it falls into the *Henleanella* group. The dorsal vessel arises in 9–10. The most advanced pair of nephridia found was in 8–9; small ante- and large post-septal, with duct as long as the latter arising from the neighbourhood of the septum. Brain about as long as broad, of normal type. No salivary glands. Cœlomic corpuscles not of the horny type.

We may now proceed to notice some of the methods by which the ever-increasing number of species may be distinguished.

THE SETÆ.—In the genus *Fridericia* one is able in many instances to come to a definite conclusion, merely by the study of the setæ in front of the girdle. Where 4, 6, or 8 setæ occur in each bundle, the innermost are the shortest. It often happens that this diversity occurs also among the Henleas; but the rule is not a constant one, and the setæ of *Fridericia* differ in shape from those of *Henlea.* Generally speaking, we may say *Henlea* setæ are needle-shaped, *Fridericia* setæ are crochet-hooked, *Enchytræus* setæ are sigmoid. The species which have shorter inner setæ are *H. dicksoni, H. nasuta, H. ventriculosa, H. variata, H. mariona,* and *H. fridericioides,* with possibly some others.

THE BRAIN.—As with the setæ, so with the brain; *Fridericia* and *Henlea* each has its type. In *Fridericia* it is very rarely concave behind, whereas in *Henlea* it is almost always so. When the brain of *Henlea* appears otherwise than concave behind it is nearly always due to tension or position. It must always be viewed from above, and is usually somewhat longer than broad.

ŒSOPHAGEAL GLANDS may be present or absent. When present they usually occur at the point where the œsophagus merges into the intestine. They may also vary in number; and few characters are more helpful to the systematist than these glands. They are not found in *H. tenella*, *H. marina*, *H. curiosa*, *H. lampas*, and some others, and we name this group *Henleanella*.

SALIVARY GLANDS are present in *H. curiosa*, *H. rosai*, *H. dicksoni*, and *H. tenella*, among others. They vary a good deal in size, shape, and position. In *H. inusitata* and *H. alba* we find glands of a special nature.

SPERMATHECÆ are present in all adults. In *H. puteana* there are two pairs. This, however, is unique, not only in the genus, but in the family. In all the other species one pair is found opening in the intersegment 4–5. There are no diverticula, as in *Fridericia*, but glands are frequently found near the external aperture, as in *H. marina* and *H. fridericioides*. *H. attenuata* has never yet been found adult, though the species is far from rare.

THE DORSAL VESSEL usually takes its origin in front of the girdle, and may frequently be seen as a white sac or a kind of pump, throbbing and pulsing vigorously. It is not unusually found near the œsophageal glands, about segments 7–9; but some of the more recently discovered species show the presence of the vessel in or behind the girdle, as in *Enchytræus* and *Marionina*. These may eventually form a new genus. In *Fridericia* its position is usually between segments 15–20, or even further back. The blood is always colourless.

SEPTAL GLANDS are present in all known species. The normal number is three pairs, situated in segments 4–6; but the number occasionally varies. In one species, which I formerly described as *H. tenella*, but now regard as a new species, we find four pairs of septal glands. The same applies to the new species described above as *H. trisetosa*. This number is exceeded in some other Enchytræids, but is not at present known to occur in any other species of the genus *Henlea*. One species in each group has only two pairs.

CŒLOMIC CORPUSCLES occur in all Enchytræids, and vary greatly. Some species of *Henlea* have corpuscles which look like horny discs. They are round or oval and brown, almost like encysted protozoa. Others conform to the regular type.

Though each species has its distinctive characteristics, some are so similar in general appearance that they may readily be confused. Thus *H. dicksoni* may easily be mistaken for *H. rhætica*. *H. curiosa* and *H. lampas* have much in common. *H. attenuata* is easily distinguished from *H. heterotropa* by its attenuated form.

I have come to the conclusion that the conditions under which these tiny annelids exist greatly affect some of their characters. Under stimulating conditions not only do they attain a larger size, but the setæ frequently increase in number. Hence there are two or three species which have polychæt varieties, the number of setæ reaching 8–12 per set in each segment. Thus an individual with 50 segments would have no fewer than 2000 setæ, though not more than half an inch in length.

It is now possible to present our facts in a systematic form, and in preparing the following key I have followed the lines laid down in my former paper (2), which is here extended to include all the known British species.

SYNOPSIS OF THE GENUS.

i. Two pairs of spermathecæ present. One species only, *viz. Henlea puteana*.
ii. One pair of spermathecæ present. Varying much in character.
    1. Consisting of a simple duct.
    2. A duct with median bulb.
    3. A duct with ampulla attached to the intestine.
    4. Glands at the 4–5 opening.

We find further species with:—

i. No œsophageal glands present; these we name the *Henleanella* group.
ii. One pair of œsophageal glands—
    1. In segment 7.
    2. In segment 8.
iii. Two pairs of œsophageal glands. One species only, *viz. H. ventriculosa*. These may be regarded as the true *Henlea* group.

Finally we have another clue in the septal glands, as follows:—

i. Two pairs of septals in *H. mariona* and *H. fridericioides*.
ii. Three pairs in all others, except
iii. Four pairs in *Henlea trisetosa* and *H. quadrupla*.

The exceptions are always easy to find, but for the bulk a key is required.

Finally we note the species with nephridia-like glands, whose character is not yet determined.

KEY TO THE GENERA.

Two Groups are recognized, *viz.*:—

I. Species lacking œsophageal glands .	HENLEANELLA.
II. Species possessing œsophageal glands	HENLEA.

The following belong to Group I.

HENLEANELLA: Œsophageal glands absent.

1. Two pairs of septal glands	*H. mariona.*
2. Four pairs of septal glands	*H. trisetosa.*
3. Three pairs of septal glands—	
i. Setæ not exceeding five per set—	
a. Dorsal vessel clitellian—	
† Salivary glands absent . . .	*H. marina.*
†† Salivary glands present . . .	*H. curiosa.*
††† Abnormally placed glands . .	*H. alba.*
β. Dorsal vessel anteclitellian—	
† Sperm-funnel spindle-shaped . .	*H. tenella.*
†† Sperm-funnel pear-shaped . .	*H. lampas.*
ii. Setæ exceeding five per set—	
a. Two pairs of spermathecæ . . .	*H. puteana.*
β. One pair of spermathecæ—	
† Duct of nephridia from posterior—	
* Salivaries present . . .	*H. rosai.*
** Salivaries absent. . . .	*H. parva.*
†† Duct of nephridia from anterior—	
* Salivaries present—	
(1) Slender or forked . .	*H. multispinosa.*
(2) Sac-like in 4–5 . . .	*H. minuta.*
(3) Unusual type of glands .	*H. inusitata.*
(4) Of normal form . . .	*H. dicksoni.*
** Salivaries absent—	
(1) Dorsal vessel arises in 7–8 .	*H. glandulosa.*
(2) Dorsal vessel arises in 8–9 .	*H. arenicola.*
(3) Dorsal vessel arises in 9—	
a. Length 2–3 mm. .	*H. perpusilla.*
β. Length 7–8 mm. .	*H. rhætica.*
(4) Dorsal vessel arises in 10–11	*H. minima.*

The following belong to Group II.

HENLEA: Œsophageal glands present.

1. Two pairs of œsophageal glands . . .	*H. ventriculosa.*
2. One pair of œsophageal glands in segment 7—	
Three pairs of septal glands—	
a. Dorsal vessel arises in 7–8—	
* Salivary glands present . . .	*H. attenuata.*
** Salivary glands absent . . .	*H. heterotropa.*
β. Dorsal vessel arises in 8	*H. nasuta.*

3. One pair of œsophageal glands in segment 8—
    α. Two pairs of septal glands . . . *H. fridericioides.*
    β. Three pairs of septal glands—
        * Dorsal vessel arises in 8 . . . *H. pusilla.*
        ** Dorsal vessel arises in 8–9—
            (1) Sperm-funnel about 2 × 1 . *H. fragilis.*
            (2) Sperm-funnel about 4 × 1 . *H. hibernica.*
        *** Dorsal vessel postclitellian . . *H. triloba.*
    γ. Four pairs of septal glands . . . *H. quadrupla.*

As it is a great convenience to the student to have these facts presented in various ways, I append a numerical key as well:—

1	Œsophageal glands absent (*Henleanella*)	2
	Œsophageal glands present (*Henlea*)	15
2	Two pairs of septal glands	*H. mariona.*
	Three pairs of septal glands	3
	Four pairs of septal glands	*H. trisetosa.*
3	Setæ not exceeding five per set	4
	Setæ exceeding five per set	8
4	Dorsal vessel clitellian	5
	Dorsal vessel anteclitellian	7
5	Salivary glands absent	*H. marina.*
	Salivary glands present	6
6	Normal in type and position	*H. curiosa.*
	Abnormal in type and position	*H. alba.*
7	Sperm-funnel spindle-shaped	*H. tenella.*
	Sperm-funnel pear-shaped	*H. lampas.*
8	Two pairs of spermathecæ	*H. puteana.*
	One pair of spermathecæ	9
9	Duct of nephridia from posterior	10
	Duct of nephridia from anterior	11
10	Salivaries present	*H. rosai.*
	Salivaries absent	*H. parva.*
11	Salivaries present	12
	Salivaries absent	13
12	Slender or forked	*H. multispinosa.*
	Sac-like in segment 4–5	*H. minuta.*
	Unusual form of gland	*H. inusitata.*
	Normal type of salivary	*H. dicksoni.*
13	Dorsal vessel arises in 7–8	*H. glandulosa.*
	Dorsal vessel arises in 8–9	*H. arenicola.*
	Dorsal vessel arises in 9	14
	Dorsal vessel arises in 10–11	*H. minima.*
14	Length of the type 2–3 mm.	*H. perpusilla.*
	Length of the type 7–8 mm.	*H. rhætica.*

15	Two pairs of œsophageal glands	*H. ventriculosa.*
	One pair of œsophageal glands	16
16	Glands in segment 7	17
	Glands in segment 8	19
17	Dorsal vessel in 7–8	18
	Dorsal vessel in 8	*H. nasuta.*
18	Salivary glands present	*H. attenuata.*
	Salivary glands absent	*H. heterotropa.*
19	Two pairs septal glands	*H. fridericioides.*
	Three pairs septal glands	20
	Four pairs septal glands	*H. quadrupla.*
20	Dorsal vessel arises in 8	*H. pusilla.*
	Dorsal vessel arises in 8–9	21
	Dorsal vessel postclitellian	*H. triloba.*
21	Sperm-funnel about 2 × 1	*H. fragilis.*
	Sperm-funnel about 4 × 1	*H. hibernica.*

In conclusion, a few special features may be pointed out. *Henlea puteana* alone has two pairs of spermathecæ, and *H. ventriculosa* is the only known species with two pairs of œsophageal glands. *H. alba* and *H. inusitata* have abnormal glands, which may be œsophageal or salivary. In *H. fridericioides* and *H. mariona* there are only two pairs of septal glands, but one is a member of the Henlean group, the other belongs to *Henleanella.* In certain cases the dorsal vessel arises in or behind the girdle. At present *H. triloba* stands alone in this respect in the Henlean group. Some of the species have the duct of the nephridium arising near the septum, in others it is posterior, and in others it has a median origin. The spermathecæ present great variety, but they never have diverticula, as in *Fridericia.*

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A DIARY OF ORNITHOLOGICAL OBSERVATION MADE IN ICELAND DURING JUNE AND JULY, 1912.

By Edmund Selous.

(Continued from p. 66.)

June 7th.—A loud and continuous clamour of Gulls obliges me to look out, when I see one of the Eagles mobbed by a crowd of them. What I have said in the last entry applies now, but the scene is more interesting, for the Gulls—always the same species—besides being more numerous, seem more indignant. Yet they appear to me to keep at a warier distance than yesterday, as though fear, for some reason, were more in the ascendant. As for the Eagle, he (for I think it is the male) is not deflected, in any great degree, from his path through the fields of air. There is no need that he should be; he can go where he will, for the Gulls, though they clamour and dash, always give way to him. Still, he seems annoyed and put out by the noisy, hostile troop. At length he comes down upon an accustomed promontory, and here the Gulls stoop at him, just as they used to at me in the Shetlands, when I sat down amidst their breeding haunts. They, however, give him a very wide berth. It is amusing to see them stretch down their legs, as though to flick his head with them (for their habits, in this respect, are the same as the Skuas') at a quite futile distance, before sweeping up again—not nearly so near, in fact, as several of them came to me. Still, some come nearer than others, and, for these, the sitting Eagle has a negligent upward turn of the head, with implied threat of beak, from which they mount, with a sudden discretion. He sits, thus insulted, till past 7, and then floats to another point, where I cannot see him, but his presence is still marked by the same cries and actions of the Gulls—for they are vociferous all the while. At length there comes silence, with neither Gulls nor Eagles to be seen, when, sitting against a great rock, near the tent, as I make this entry, one of the latter passes me quite close, over the water, at about the same height as I sit, on flapping wings—flapping continuously, as a Rook flaps his—and, without appearing to notice me, flaps straight for a promontory, round which he disappears. "Oh, the difference of man and man"! and, no less, of Eagle and Eagle, or of the same Eagle, at different times. Flying like this, he looked no more than a large brown bird plodding—yes, *plodding* laboriously along—that ever I should write so of such a bird as he has been! This was at 7.30. From then till now, at 8.10, all is still, and not a sign of either of the Eagles. At 10, however, one of them goes off the eyrie, and again I notice the fallen manner of its flight, for instead of floating lightly and grandly, as before, this bird now—no longer an Eagle—gives a series of flaps with the wings, at short intervals, and only floats, or, rather, just holds itself up with them, for a few seconds, between each series. I cannot, at first, understand this sad change, but, all at once, it occurs to me that the wind has sunk since the early morning, and that it is now a dead calm. This then, evidently, is the explanation. Wind is necessary; not even an Eagle can float or soar in a motionless atmosphere. To do so, probably, on a morning like this, it would have to ascend into the upper air-currents, which is not now convenient for it. These lords of the winds, then, are reduced to flapping, on a calm day.

Almost as soon as the Eagle leaves her eyrie, she is pursued by Gulls—always the Black-backed kind, I have seen no others on the lake—and, perhaps to avoid them, settles on a favourite promontory of both the birds, and, unless it is the other of the pair, is still there when I re-enter the tent, about 11; but I cannot make out any bird on the nest. Towards 11.30 she flies off over the brow of the hill, and I then go to sleep till about 1 p.m. The nest is then still empty—whether it has been occupied for any time in the interval, I cannot, of course, say. At 2 or 2.30, the bird—it is always the same one, and the female—comes down by it, but it is only to fly off again. There is now a long, dreary interval—nothing is more dreary than sitting in a tent, and seeing nothing—till almost 5, when the Eagle floats grandly up (the wind has, for some time, been rising, and is now at its highest), and goes quietly on to the eyrie. At 5.45, 6.35, 8.10, 9, and 9.40 she is still there. This watching from a tent, and being afraid to go outside it, is horrible confinement. In one short previous ramble, however, I had made the following observations.

On the summit of the cliffs, here, into which the first steep green slopes, rising almost from the shore, break, is a little green-peaked hillock, making the loftiest point hereabouts. Seated upon it, one seems to look directly down upon the waters of the lake, so that, still as they now are, one can see to the bottom of them, for some way out. A pair of Mergansers—the male in fine nuptial garb—are coasting along, and constantly diving for food. All their actions, in procuring this, can be followed, though in a shadowy way, through the glasses. They search the rocks, stones, boulders, with which the bottom of the lake is strewn, or rather covered, and whatever they get is evidently close to their surface. As they often go through the actions of pursuing something, the prey must be active—some kind of rock-fish perhaps. At other times they stop, and appear to be probing into chinks, crannies, &c., and, when they do this, they certainly have the appearance of sitting or crouching (as, before, thay had, sometimes, of walking) on the rocks, for their bodies look as though flat upon them, and the way they sometimes move, then, for a moment or two, also gives this idea. Certainty upon the point, however, is hard to obtain, for they do not come in quite close to shore, but seem to prefer the water to be of a moderate depth. In the descent to the bottom the feet are alone used, as one can plainly see, the wings being pressed to the sides, whilst, in rising, the propelling power seems to be a matter of pure physics, for the bird presents every appearance of merely allowing itself to rise. However, it keeps itself in position, which must imply steering, for the ascent is always in a steep slant, never perpendicularly. The motion is continuous, without any jerking—a long glide up—and the idea gained, though it is difficult to see this, is that the legs trail behind, and play the part of a rudder, as with those birds—Penguins, Puffins, Razorbills, &c.—who habitually use them so, whilst swimming, with the wings, under water. These Mergansers dived and came up at what seemed very regular intervals, and it may have been owing to this merely that the male seemed always to wait for the female to dive, and, shortly, to follow her. What is really waited for is, I believe, the requisite breathing space, so that, with this regularity, a pair would tend to precede or follow one another, according to which one bad first gone down.

June 8th.—At about 4 a.m., when I look, I can see no bird on the nest. At 6.30 the head and yellow beak are plainly visible. At 7, and now, again, at 7.10, I do not see them.

About half an hour after this, I catch a glimpse of one of the Eagles on a projecting, rocky bastion of the cliffs, from which he appears to leap down, and I lose him. A little afterwards I see him, or the other one, flying across the lake. It is a perfectly still, calm morning, the sky everywhere obscured under a high-hanging canopy of white or grey clouds, yet still bright—the lake a dead calm. Accordingly, the Eagle, in crossing it, flaps quite heavily. He flies low; a Gull thinks it worth his while to follow and demonstrate against him.

A little while after this—towards 8 a.m.—there is a great noise and clamouring, and I catch a sight of both the Eagles on a distant, rocky headland, yet not so distant but that, a moment afterwards, the glasses give me a fine view of them. One of the two, which I judge to be the male, seems to be making all the clamour. He throws up his head in exactly the way that a Gull—say, a Great Black-backed Gull—does, and utters a series of cries which may be very fairly rendered in this way: "Quee, quee, quee, quee, quee—pudja, pudja, pudja, pudja, pudja"—cries which I have heard, several times, during the early morning, without being able to affix them. The last of the two sounds has a guttural intonation, is strongly uttered, and really does bear a considerable resemblance to the word by which I have rendered it—to my own ears, at least. The "quee" which precedes it is that small, squeaking note which seems common to the birds of prey—Sparrow-Hawk, Kestrel, Buzzard, Merlin, &c., all have it. Of course the strength of the sound is greater here, conformably with the greater size of the bird—still, it is a thin and weak one, for that size. Here also "quee" (or "ee") seems to me a fairly just rendering of the note. These cries of the Eagle seem to exasperate, make mad, the pair of little

Hawks or Falcons—Merlins, I take them to be—before-mentioned. They dash fiercely at the clamouring bird, coming down, like little, black, angry arrows, almost upon him, shooting up again, when just beyond his reach, wheeling and again shooting down. The Eagle, for his part, gets angry too. He bends his great bill against his small, would-be assailants, lunges up at them, as they descend, and even sometimes makes a jump, to meet them. The Merlins draw off, after a time, return, with fresh anger, upon a fresh vociferation, and then desist as if it was no use. A little afterwards the Eagles adjourn to a much nearer promontory, offering a flatter and more commodious space, and here they stand quite close together, preening themselves, and sometimes, perhaps, bestowing a touch with the beak on one another, but of this I cannot be sure. Their actions show affection, but seem to have no more special import. Before this, they have sat with a space of a few yards between them.

At 8.16 one of the pair flaps heavily up, and at once broods the eggs. At 9 the other Eagle flies past the nest, turns and flies back past it. He makes the squeaking note, as he passes, and, on coming down upon a grey spike of rock which I have sometimes mistaken for himself, indulges in the guttural "pudja." This Eagle is browner than the other one, the head less white, and the white not so far extended downwards. I take him to be the male and the younger of the two, yet the bill is much lighter, not of nearly so vivid a yellow. The body, but not the bill, of the female seems faded with age.

At 9.15 or thereabouts, on looking again through the window of the tent, I find that the sitting Eagle has joined her mate, and stands perched close beside him, on another spike of rock. Both birds, now, as I have the glasses upon them, throw up their heads, and clamour, together, in the way that the one has formerly done. Again it is a fine, wild sight, but the cries themselves are not of a grand-sounding or impressive character. The cry of the Great Black-backed Gull, when thus vociferating, has a wilder and more spirit-stirring ring in it. They, too, throw up their heads and shriek, together, in just the same way, presenting, then, so fine an appearance as accuses all who speak disrespectfully of this species—and there is none towards whom greater licence of speech is commonly indulged in—as greatly wanting in poetic sensibility and appreciative perception. Never, hardly, is this handsome bird mentioned without a heated denouncement, which often takes the form of mere abuse—"brute," "pest," "nuisance," and the like—but one might watch till one starved before one saw it do a millionth part of the harm that being able to see it does not more than a million times atone for, and it would be well if those who are most unrestrained in their epithets would pause, in the midst of them, and ask themselves this question—just this: Whether, over the whole British coast-line, there is any wild, rocky foreshore, any inlet, bay, islet, "stack," "ness," or green, rounded

> . . . "Summit of the cliff
> That beetles o'er his base into the sea,"

that could not better spare *their* presence than this bird's. As for the delinquencies urged against it, some are fabulous or take place at very long intervals, whilst others are artificial crimes, merely, and of no consequence whatever to humanity, looked at from a large point of view. But the high æsthetic pleasure which the sight of this, the largest and most imposing of our Sea-gulls, gives to all who are capable of feeling any, *is* of consequence to humanity—to humanity at large, the best part of humanity—and of very great consequence, too: it is a pleasure analogous to, and strongly enhancing, that which the landscape itself—which the very rocks and waves afford. Also there is the natural history, which belongs to every species and ceases with it. It is, for instance, more interesting and instructive to record what I have recorded of this mobbing by Gulls of an Eagle, than to get rid of the former out of mistaken sympathy for the latter, which is itself being got rid of still faster. I do not say that this is or is amongst the reasons brought forward for the persecution of this and others of our Gulls, but, if it were, it would be on a par with some that have been, and *ex uno disce omnes*.

After the Eagles have thus vociferated, they continue to sit together, each on its rocky spicula, for some time. They preen themselves, turn themselves this way and that, seeming, from time to time, to take an extended view of the blasted and Hades-like landscape around them. They are very close to one another, sometimes their heads seem almost touching, and one might imagine them exchanging remarks. To watch them and think that they are really Eagles, living their life and unconscious of a human presence, is very pleasurable, but the cramped and constrained attitude which a small tent pitched on an uneven surface, and which persists in sagging down, alone permits of, makes it impossible to do so for long, continuously. To see is to be racked, and not to be racked is not to see, so, when I next look, the male Eagle is gone. The other, now sitting solitary on its crag, every now and then turning its head towards the lake below, is a fine sight. Suddenly, from the other side of the tent, where all is invisible—for it is pitched against a rock—there is a tremendous rushing sound. I have heard it before, under much the same circumstances, and if it was the stoop, upon prey, of the other Eagle, am sorry indeed to have missed the sight of it. I think it must have been, for it is just the grand and terror-causing sound that a pair of them made when stooping on some Rock-Doves in Cashmere, once—the latter, by the way, eluded every stoop with wonderful activity, looking each time—and no doubt quite truthfully—the very picture of terror. In this case, however, the stoop may have been on a fish, as before. Whatever it is, the sound, joined to the majestic figure on the rock, makes an effective whole, bringing Tennyson's lines on the Eagle strongly to my mind:—

> "He clasps the crag with crooked hands;
> Close to the sun, in lonely lands
> Ring'd with the azure world, he stands.
>
> "The wrinkled sea beneath him crawls;
> He watches from his mountain walls,
> And like a thunderbolt he falls."

Great poets may see everything, without going afield, and the way they are baited by mere great clever men, with nothing of poetry about them, "is a heartbreaking." (Tenez, Messieurs, ... &c., car c'est à vous.)

After a little, the female Eagle leaves her place, her flight being followed (as is common both with great poets and Eagles) by the cries of Gulls. At 11.30 she returns to the nest, but has hardly settled herself on it when my walking-stick camp-stool, which I had used for supporting the constantly sinking-in roof of the tent, falls with a slight noise, and she goes off again. It must, I suppose, have made a flash past the window, for she can hardly have heard the sound. This is a horrid nuisance.

At 2 p.m., as arranged, Sigurdsson and his brother come for me in the boat, and we get away by about 3. The Eagle has not come back again, but she has stayed away as long and longer before, and I think without my frightening her.

I will add a few remarks on the subject here touched upon—somewhat a painful one for me, as there is nothing I less like to do than to disturb injuriously, or at all, if I can help it, any bird that I watch. As the Eagles were incubating when I commenced my observations, but had presumably abandoned the eggs (which were never hatched) when I returned, in July, it would occur quite naturally to anyone (more particularly to anyone who had cherished designs on them)* that I was the cause of their desertion. I will, however, mention some points that seem to me to raise a doubt in regard to this, the benefit of which I should be glad to give myself. These points are as follows :—

(1) Sigurdsson felt sure that we should find the eggs hatched on our arrival, and supposing them to have been healthy ones, it may be assumed that they were, at least, in an advanced state of development. In such circumstances, the female bird would, ordinarily, sit very close, and not be easily driven away. This was so in the case of a pair of Merlins which I afterwards watched at much closer quarters, the female taking entire charge of the eggs, though I had abundant evidence that it was not fear which prevented the male from brooding them. The same rule also obtained with a pair of Sparrow-Hawks which I watched under conditions of perfect concealment.

(2) The boys I have spoken of were often about, in the neighbourhood of this eyrie, as also, presumably, the owner, or rather tenant, of the land on which it was, from time to time. The birds would, therefore, not be unaccustomed to people, nor do they appear to be particularly shy in Iceland. According to Sigurdsson they always build in the neighbourhood of human habitations or belongings, and not in the uninhabited wilds.

(3) If closely followed, the actions of the female Eagle do not seem very consistent with the theory that her frequent long

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* See a note, in this connection, in the January number of 'British Birds,' p. 238.

absences from the nest were due to my presence, which I made as unobtrusive as I was able to. They were sometimes longer when I have every reason to suppose that she was quite unconcerned, and *vice versa*. Also, she showed no apprehension, but sat fast whilst three of us were putting up the tent. Assuming the eggs to have been addled, the conduct of the bird can be explained by supposing that she suspected or was becoming aware of this fact. Birds do become aware of it, and at last leave the eggs, in consequence, nor is there any evidence of the date when these were abandoned, or, indeed, that they were altogether abandoned a month or more afterwards, on my return, though I thought they were.

(4) The proprietor of the eyrie told Sigurdsson that the eggs of these Eagles were often addled (a fact which would be discovered by the daring purchaser on blowing them, or even before), that one could not say, from year to year, whether they would be or not, but that they were seldom good, two years running. This is a positive statement, and tallies with a similar one made to me, in regard to another pair, by a man who had exact knowledge of the facts, *viz.* that the eggs laid for six years in succession were infertile. In this case the female was thought to be very old, and from her greater hoariness, I may assume that the one in question was aged also. If I really caused the eggs to be abandoned, I am extremely sorry—I was vexed enough at the time—but I do not think this is likely in itself, and, in fact, I have given another explanation which must be held to be more than likely, since it is a known one. The tent was placed as far off as the conditions permitted —I would have preferred its being at twice or even three times the distance, but this was impossible without rounding a bend of the cliff which put the eyrie out of sight. It was, indeed, a bad place for observation. As I have said, the tent was (and daily and nightly I wished it wasn't) a "Mommery," of, I believe, the smallest size obtainable, made of green Willesden canvas, over which was a netting, in the meshes of which moss from round about was plentifully stuck. It was close against a great rock of cottage-like proportions, and I am tolerably sure that the birds did not mind it much in itself—the female most certainly did not. In conclusion, I may say that if I had not

bought the right of watching this eyrie, the eggs would, *as a certainty*, have been seized, and that, before leaving, I purchased for the birds, the right of bringing off their young, the following spring, should their eggs then prove fertile. No one, knowing this, can collect them, now, except through such dishonourable methods as must quite dim the lustre of the exploit.

June 9th. — After breakfast and another more substantial meal, close following it—for in Iceland they practise the food-cure—I start with Sigurdsson for the Swans. Above the third waterfall, the river widens into a small lake, and on an island not so small in proportion to it we see, as we approach, one of the pair—most probably the female—steadily engaged in incubation. As she sits, gleaming white, on the top of a great mass of brown, with her long neck upstretched, and the yellow of the bill brightly showing, it is impossible to help thinking what a splendid example of concealing coloration such a species must be, whenever a white mist conceals everything. Otherwise, however—and to-day it is otherwise—it would be hard to conceive anything more pleasingly conspicuous. It should be remembered, however, that in a country like Iceland white mists must be far from infrequent, even in the summer, whilst in winter they probably predominate, at which time their effect, in this connection, would be largely aided by snowstorms, but still more effectively, perhaps, by the bird leaving the country. In this last, we no doubt see an adaptation to particular circumstances of the same general law, since nothing is more salient than white, in the dark, and there is a good deal of mist, south of Iceland.

Just at present, however, there is no mist in Iceland itself, or, at any rate, not in this part of it, and so there, as a consequence, the Swan sits and gleams, and is, in fact, so very conspicuous that, without turning round and looking in the opposite direction, it is difficult to see any part of the landscape except in some sort of reference to this telling white spot on it. A Swan, in fact, thus fixed by her duties, becomes soon, to one's seeming through her whiteness and brightness, as the centre of a world that radiates out from her, and only through such a nucleus enjoys harmony and a proper relation of parts to the whole and one another. The principle of order, as also of love, in the universe, seems concentrated in the breast—the "excellent white bosom"—of the sitting bird—to such an extent, indeed, that coming, any day, and perceiving her no longer on the nest (made empty both of her and hers, perhaps, by one who came not to observe, but to destroy),* the eye misses something which it in vain endeavours to do without, finding the landscape dreary and comfortless, without a heart, as it were, to beat in it. Doubtless the size of the Swan, added to her grace and comeliness, helps to produce this impression, which, fanciful as it may seem, I have felt myself very keenly, insomuch that I tried, once, to think it was concealing coloration only, and nothing else scientific, that made the bird (or rather the pair of them) thus suddenly, and ever afterwards, invisible—but it would not do.

Shortly after seeing us—and she sees us immediately—the Swan takes to the water. I am behind rising ground when she does so, but Sigurdsson calls to me, and, coming round the ridge, I see her upon it, whilst three out of four little fluffy-grey cygnets, who really have, now, a somewhat concealing coloration (which on principles not necessarily incompatible with its theory, since white mists may be more frequent than grey ones, they are shortly to lose), have followed her, one half-way to the edge, and the other two farther. The mother bird, as I take her to be, hangs about, near the bank, on the water, and utters, at intervals, a note which has very much the sound of "hoop, hoop," whence, perhaps, as some might argue, comes the old English name of "Hooper Swan," for it was originally spelt in this way. She certainly seems trying to call the young ones to her into the water, but they do not come, and this makes me think that they have not yet been into it.

We now set up the tent in a place where it is not visible from the island, but, before this is accomplished, I crawl to a good place of espial, and find the parent Swan sitting on the bank, with three of her cygnets under her, whilst the fourth still sits in the nest. I continue to watch after being left alone, and, after a time, the old Swan gets up and walks to the nest, which she ascends, and broods the one cygnet. The three others follow slowly and by short stages—toddling, as it were—and one laboriously ascends the great mound, and disappears under its mother. After a little interval the other two follow, and now, at 2.15 p.m., the Swan is lying asleep, on the nest, with all four of them under her, her head pressed into the feathers of her back, as probably she was before our arrival, though, when I first saw her, she had her long neck upreared, the sign and token of her vigilance. All at once, I see the partner Swan—the male as I suppose him to be—out on the water. He floats idly upon it, looking very graceful—a wild grace, differing a good deal from that of our half-domestic species—and beautifully white. Gradually he goes in closer to the bank, which, before very long, he ascends, and lies down close to the water's edge, amidst some marigolds—that, at least, is what they look like—their gold and his silver making a pretty combination—for there is something silvery in the quality of the whiteness of Swans, both here and at home, whether real or imaginary, merely, I do not know, but always there is the suggestion.

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* "*Collect*, the wise it call."

Both parents lie asleep, now, in the warm sun, the female on her nest, and the male at some fifty yards' distance from it. The cygnets, presumably, are asleep too, under their mother's feather-bed; it is pleasant to see that there is no more fear or suspicion. This, however, returns shortly afterwards, for having tried, without success, to find a point from which I can obtain a different and nearer view of the Swans, I return to the old place, but find it impossible to place myself exactly where I was before. The birds, I suppose, catch a glimpse of my head, though it is hardly raised a foot above the ground; they seem slightly uneasy, and the male goes out upon the water again. However, as I keep quite still, with my back pressed against a slanting turf-bank, above which my head does not now rise, he soon ceases to be apprehensive, and begins to feed, after the known and noted manner of Swans, stretching down his neck in the water and throwing up his legs in the air. He continues thus feeding till about 5, when he returns to the bank again, and, standing in a shallow place, just off it, preens himself for some little time. He then swims along, close to the bank, till opposite the nest, stays there a little, as though talking to his partner upon it, then returns, and swims out into the lake again, where he feeds as before. At 6, or thereabouts, he comes back to the bank, but soon swims out again, this time into the middle of the water, and much closer to me. Here he continues to feed strenuously, though from 12 o'clock, as a minimum, his wife and children have sat without bite or sup. At 7.30 p.m. I am so cold and hungry that I have to go to the tent, and this I do without alarming the feeding Swan, quite easily, though I have to pass in full view of him—I am soon out of sight of the other. The *modus operandi* is sufficiently simple, since he is always putting his head under water, and keeps it there, each time, for a minute.

(To be continued.)

NOTES AND QUERIES.

MAMMALIA.

The Hedgehog in the West of Scotland.—I am interested to hear that so long ago as 1877 Mr. Bolam saw a Hedgehog on the side of Ben Cruachan.* Of course, in treating of the species to the west of the watershed or backbone of Scotland in our volumes on the 'Fauna of Scotland,' Buckley and the present writer did not speak of it as a *decadent* or *disappearing species*, but on all occasions as of comparatively *new occurrence*, and as an advancing dispersal, dependent upon circumstantial changes in the features of the west, such as road-making and planting, and perhaps introductions. It is, therefore, not quite in keeping with the subject of dispersal to speak of the Hedgehog as "*still* not uncommon" in such and such a locality in the west. As regards the North-west Highlands, both Buckley and the present writer have had almost a lifetime experience, and in certain parts an almost yearly—and together—continuous residence, and I think what has been said in such of our volumes as treat of the areas to the west of the watershed, about the general scarcity of the animal in question, and its slow progress over the dividing ranges and advance only through certain defiles or lower lands, I say, I think what we have said fairly represents its *more recent dispersals*. These have been principally *recorded* by quite a limited number of avenues. This, however, in no way interferes with any earlier records which may be attainable since, as in the case of Mr. Bolam's finding it on the slopes of Ben Cruachan in 1877, and the one on Loch Maree, between Kinlochewe and the Loch Maree Hotel, near to Talladale Bridge, in 1888. These two may certainly be entered as *Records*—the earliest I have from these passes through the backbone of Inverness, Ross, and Argyll; and both Buckley and I have had pretty continuous knowledge of a very large portion of the areas involved. Besides, we have, either in our possession or have examined, a very extensive series of Vermin Schedules from most of the large estates throughout the Counties of Argyll, Inverness, Ross, Sutherland, Cromarty, and Caithness, going back through many decades; so these matters can scarcely be said to have been neglected or "skipped over" as "common things," not "considered worth while putting into print." I can hardly admit that that "*blaime of burial*" can lie with us. We have always endeavoured to point out that, however interesting the history of extinct or dying species may prove to be, there is scarcely less interest in the progress of the living, and their dispersal, increase, and extension of range. The outcome of such records may not perhaps be so patent or useful at this present time *as they may become at some future date.* We have so often indicated the advisability of continuous recording where practicable that we do not care to "rub it in" further, as it had been complained we did so before! The following is a rough summary of actual records so far as I am aware:—

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* 'Zoologist,' *ante*, p. 75.

Sutherland and Caithness and West Cromarty: At date of 1888 we had had experience of that area, and especially of the western side of the watershed since 1865; and in square brackets or *Obs.* we said: "It is still unknown in the west, and, so far as is known to us, in all other parts of the counties"; and, "though pet specimens have been introduced, and have escaped, there is no evidence that they have established themselves in a wild state" ('Fauna of Sutherland,' &c., p. 71).

In Argyll, also, when we wrote in 1892, we do not appear to have possessed a single record of it in that area; so Mr. Bolam's, in 1877, takes long precedence, and admits it at least to the Loch Awe district.

In the North-west Highlands—in the volume on the fauna of which we bring Sutherlandshire, west of the watershed, down to date of issue—we still find it *absent* and *unrecorded* in Assynt or Edderachyllis. But at Loch Broom (West Rosshire) it "appeared in 1900 (probably imported in baled hay)"; auct. Sir Arthur Fowler, of Inonbroom's MS. Several were seen that same year, but none since, *till quite recently*, when—as I am informed by Mr. Alan A. Fowler—"it is *now* not uncommon, *i.e.* in 1912."

At Gareloch, North-west Rosshire, Mr. Osgood Mackenzie informed me: "The first seen was on 16th December, 1902." And now we have the earlier date, *further inland*, of 1888, from Mr. Bolam.

On the shores of Loch Eil, at date of 1904, we find it known on the authority of the landlord at 'Coopact Inn.' Then at Loch Moidart, right in the west and north side from Shiel Bridge and Loch Shiel, Mr. J. C. Stewart, of Kinloch Moidart, records the first seen there by him, in July, 1912.[*] But two others were previously met with between Shiel Bridge and Doolin.

At Attadale, where Buckley had the sporting rights, and resided for more than one season, he had *no notes* of its occurrence there; but since he left Attadale, W. Hinxman collected evidence of several in 1894.

At Balmacana House *one* was seen, on the authority of Mr. Aira White, who was residing there, but it may have been an introduced example.

I would be glad to hear of any other actual records, *fully authenticated*, such as Mr. Bolam has supplied to 'The Zoologist' (*ante*, p. 75, *q.v.* I should perhaps mention in this connection that I do not refer to any localities to the east of the main watersheds or backbone of Scotland, though Mr. Bolam refers to such places as Glen Urquhart, Invernesshire.—J. A. HARVIE-BROWN (Dunipace House, Larbert, Stirlingshire, N.B.).

Since the above was written I have asked my friend Mr. Chas. H. Alston, who has resided for many years at the Pass of Brander, on the west shores of Loch Awe, Argyll, how many Hedgehogs he has *himself seen* in his neighbourhood. His reply is: "I have personally met with two or three here." He is informed, however, that "they are quite numerous on the other side of the Pass of Brander, at Hayfield" (*in lit. March 7th, 1913*). Hedgehogs are stated also to be plentiful at Innistrynich, on the east side of Loch Awe. Also, a middle-aged[†] native of Loch Etine side tells Mr. Alston that he has known them there "ull his life"; also that he has known them washed up dead after a spate in the Orchy. "So," adds Mr. Alston, "so they are not a new arrival in Lorne—*so far as word-of-mouth evidence is of value.*" Quite so! but word-of-mouth evidence does not constitute what naturalists deem *a Record*—only a *guide* to further investigators, which it is not in the case of *rarer* animals *always* wise to divulge. As we are aware, some people have not yet got the fact into their heads that some animals may be actually increasing, and *are* doing so.—J. A. H.-B.

A Recent Capture of the Marten (Mustela martes) in Lincolnshire.—A few years ago I saw an example of this species in the hands of a Lincoln taxidermist, but omitted at the time to record the occurrence. The specimen is now at the 'Crown Inn,' Glentham, near Lincoln, in the possession of Mr. G. H. Massam, who has informed me that the animal was a female changing from winter to summer dress, and was caught in Fenwood, in the parish of Caenby, on April 26th, 1905. This locality is not far from the ancient haunts of the Marten in Central Lincolnshire, where up to about 1875 it was a comparatively common animal. The last previous record known to me of a Marten captured in Lincolnshire is of one killed near Sleaford about the year 1888 (*cf.* Zool. 1893, p. 354), so it is probable that the species is now practically extinct in the county.—F. L. Blathwayt (Doddington Rectory, Lincoln).

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[*] Mr. Stewart has been resident and proprietor of Kinloch Moidart for many years, and is a keen sportsman, and observant of natural history occasions.

[†] In this connection readers please remember the date of Buckley and my writing the volume on "Argyll" was *1892—twenty years ago.*

AVES.

Occurrence of the Stone-Curlew (Œdicnemus scolopax) in Co. Cork.—In the last week of February the first specimen of Stone-Curlew (or Great Plover) obtained in this county was sent by Sir Egerton Coghill from Castletownshend for preservation to Mr. Rohu, naturalist, of Grand Parade, Cork. — Robert Warren (Ardnaree, Monkstown, Co. Cork).

Instance of a Black-tailed Godwit (Limosa belgica) Living in a Garden. — Some weeks ago, when walking through Ballybricken demesne and passing the garden-door, Mr. Lehane asked me in to see a strange bird he had wounded on the shore, which, being only slightly injured in the wing, he, not wishing to kill it, had let loose in the garden, and, as he had never seen a bird like it, wished me to examine and tell him its name. We entered the garden, and after some time looking about he saw it behind a bush, and, rushing forward, snapped it up before it could escape, and, bringing it to me, I was surprised to see the finest specimen of Black-tailed Godwit that I ever saw, in perfect plumage and in the finest condition of any wader that I ever handled, almost as fat and plump as a Partridge. Strange to say, the bird received no food of any kind save what it could pick up about the garden, and found sufficient water, I suppose, by sipping the rain and dewdrops off the cabbage and broccoli leaves. It had been living in the garden for three months, but had plenty of feeding ground to wander over, for the garden (fruit and vegetable) has an extent of between four and five acres.—Robert Warren (Ardnaree, Monkstown, Co. Cork).

The Occurrence of a rare Arctic Visitor made known by a Falcon.—On Feb. 17th a man walked into the shop of Mr. Rohu, naturalist, Grand Parade, Cork, with the remains of a Gull to show him, which proved on examination to be the wing, leg and foot, and part of the breast of a freshly killed specimen of an adult Ivory Gull (*Pagophila eburnea*). The man's story was "that as he was walking on the Marina [the embankment that separates the city park from the River Lee] he observed a large hawk on one of the trees that line the Marina, and when passing the hawk dropped something, and the man, going to see what it was, picked up the remains of the Gull, upon which evidently the Falcon was feeding." It was strange that from the hundreds of small Gulls nesting in the park the Falcon picked up this rare Arctic visitor. This is only the second specimen of Ivory Gull obtained in this county; the first was shot in Bantry Bay by the late Captain Newburgh in the winter of 1852, who presented the specimen to the late Dr. J. R. Harvey for his fine collection of Irish birds now in the possession of Queen's College, Cork.—ROBERT WARREN (Ardnaree, Monkstown, Co. Cork).

An Ornithological Primer.—These lines, composed by a famous ornithologist to teach some children the Orders of British Birds, have never before been printed :—

" *Passeres* are lark and linnet,
Perching birds are mostly in it.
Picariæ now you must not pooh-pooh
Woodpecker the Swift and Hoopoe.
Then come *Striges :* all are Owls,
These are Pallas's favourite fowls.
Accipitres : now what are they ?
Eagles, Kites and Birds of Prey.
Steganopodes on sea-crags,
Gannets, Cormorants and Shags.
Herodiones next include
The Spoonbill, Hern, and Bittern brood.
With *Anseres* we hope to meet
The Swans and Geese with webbed feet,
And all the ducks from Teal to Wigeons.
Columbæ stands for Doves and Pigeons—
Grouse and Partridge are *Gallinæ :*
Pheasant with his breast so shiny,
Gamebirds all and Quail so tiny—
Some do *Fulicariæ* shoot :
Crake and Rail and baldhead Coot.

Limicolæ wade on shores,
Dunlins, Curlews: there are scores;
Plovers, common Snipes and jacks
Œdicnemus; Scolopax.
He who order *Gaviæ* learns,
Rinks of Skuas, Gulls and Terns.
Order *Alcæ* waddly walk,
Puffin, Guillemot and Auk—
But alas! we live too late
To see the Auk they called 'the Great'—
Pygopodes don't forget,
Grebes and Divers love the wet.
Stormy Petrel: Mother Careys
Ends the list with *Tubinares*."

F. R.

OBITUARY.

ADAM SEDGWICK.

THE world delights in personality, and British Zoology has lost perhaps its most interesting personality by the death of Professor Adam Sedgwick on Feb. 27th. He was born in 1854, and was a great-nephew of the geologist of the same name, who was professor in Cambridge from 1818 to 1873, and who was best known for his work on British Palæozoic Fossils, and for his trenchant attacks on the doctrine of Evolution. The family was a Yorkshire one, the uncle having been born at Dent, and the nephew having spent most of his early life there.

Adam Sedgwick, Jun., was educated at Marlborough College under Bradley, later Dean of Westminster, and Farrar, later Dean of Canterbury. He was designed for the medical profession, and entered King's College, London. In 1874 he came up to Trinity College, Cambridge, then the centre of Biological science in the University.

Michael Foster was at that time prælector in Physiology at the College, and he had already begun to attract around him that band of keen researchers who subsequently developed the Schools of Physiology, Zoology, and Botany at Cambridge. The late Prof. Bridge, also of Trinity College, was Demonstrator in Comparative Anatomy.

Francis Maitland Balfour was there, beginning those classical researches in Embryology, which were to give England the lead in this branch of science. The late Sir G. M. Humphrey was Professor of Anatomy, but his interests extended to every branch of Vertebrates, as his work on Comparative Myology and on the Origin of the Paired Fins amply testifies. Alfred Newton had comparatively recently been appointed Professor of Zoology; he was not a morphologist, but he had been through the evolution controversies, and was a charming and convincing exponent of Darwin's theories. About this time commenced the association of the University with Anton Dohrn's Zoological Station at Naples, which has continued unbroken to the present day.

Our undergraduate quickly fell under the influence of these men, but for him the greatest attraction was not their lectures, but the practical classes held in connection with every course of lectures delivered by the younger teachers. To convince himself he required to see every fact which he was taught. In Foster's practical course on embryology he saw the recapitulation of supposed ancestral stages in many vertebrate animals, and this gave such substance and definiteness to his ideas of evolution that he decided to throw in his lot with pure science. He recalled with warm appreciation the first course of lectures delivered by Gaskell, and this pleasant recollection was never effaced by his disagreement with him on the thorny question of the origin of vertebrates.

Sedgwick had most joyous recollections of his undergraduate days, numbering among his friends several of the present leaders in the different branches of biology. The late Prof. Milnes-Marshall he saw frequently, and among his happiest memories were the times he spent with Dr. A. S. Lea, the biochemist, both in Trinity and in their annual camp in the Fens.

Sedgwick took his degree with the highest honours in 1877, and at once threw himself into embryological research. He was intimate with F. M. Balfour, for whom he conceived an affection almost dog-like in its devotion. He soon became acquainted with the late Prof. Moseley, of Oxford, and Sir E. Ray Lankester, for whose work he had the greatest admiration. His first work was done in collaboration with Balfour, showing the existence of a head-kidney in the embryo chick, and the connection in development between the Müllerian and Wolffian ducts, ending with the discussion of the homologies of the excretory system in Vertebrates. This he followed up by three further papers on the development and homologies of various parts of the same system in the chick, to which little has been added subsequently, in spite of the enormous improvements in technique since those days.

In 1880 Sedgwick was elected to a Fellowship at Trinity. He was still working in Balfour's little laboratory, among his comrades being the late Prof. Mitsukuri, Walter Heape, and Prof. S. J. Hickson. He was also demonstrating to Balfour's rapidly growing classes. An interesting and beautifully complete research was his account of the elaborate kidney of Chiton, practically unknown before.

In 1882 the University created an extraordinary Professorship in Animal Morphology for F. M. Balfour, but the post became vacant in the same year owing to his untimely death in the Alps. The young school seemed in danger of extinction, but fortunately the University trusted Sedgwick, for whom Trinity created a College Lecturership, really a special contribution from the College towards the needs of the University. A laboratory was at that time being built for the practical teaching of Zoology, but a change in the medical curriculum necessitated an enlargement, so that in 1884 the roof of a neighbouring building was bodily lifted by the Engineering Department of the University, giving a room capable of holding upwards of one hundred students, though the actual classes at that time only numbered about fifty. In the same year the University created a Lecturership in Animal Morphology for Sedgwick, which in 1890 was changed to a Readership. The Department was thus recognized as autonomous, and it continued in the same position, until it became merged in the Department of Zoology in 1907, when Sedgwick succeeded Professor Newton in the Chair of Zoology and Comparative Anatomy.

Sedgwick's position in 1882 was a difficult one. He was called upon to succeed one of the most brilliant and charming personalities that the science of zoology has known. He was of the same standing as his demonstrators, and he was little older than his students. He was called upon to teach, and subsequently to act as counsellor to, students in all branches of morphology, while his own attention had been almost exclusively devoted to vertebrate embryology. Miss Alice Johnson worked (largely in conjunction with Dr. Gadow) on the development of the vertebrate skeleton, W. Bateson on Balanoglossus, the late Prof. W. F. R. Weldon on vertebrate embryology and Dinophilus, F. G. Heathcote on Myriopoda, and A. E. Shipley on the Lamprey and Gephyrea. S. F. Harmer began that long series of researches which have so greatly clarified our ideas on the Polyozoa. Caldwell, in conjunction with Threlfall, was then perfecting the first automatic microtome, but later he was sent to Australia, where he discovered the egg-laying of the Monotremes. Heape was concerned with the early stages of mammalian development, and Hickson, who soon largely took charge of the advanced teaching, was actively interested in the Alcyonaria, and made his discovery of the medusæ of Millepora.

In the midst of such activities Sedgwick's own work necessarily suffered, but his published papers show that he was thinking deeply about the origin of metameric segmentation, and of the central canal of the nervous system of Vertebrates. Balfour and Moseley had both been interested in *Peripatus*, and in 1883 Sedgwick went to the Cape, from which he brought back over three hundred live specimens. His subsequent 'Monograph on the Development of *Peripatus capensis*' obtained for him election into the Royal Society. It is a classical work, and a model of how such a research should be carried out and presented. It showed the relationship of Arthropoda to Annelida, now expressed in the use of the phylum-name Appendiculata. It suggested important considerations as to the origination of the Metazoa from the Protozoa, and of the Triploblastica from the Actinozoa. It clarified the whole question of the morphology of the body cavity, cœlom and hæmocœle in all higher animals. 'A Monograph of the Species and Distribution of the Genus *Peripatus*' followed, while W. L. Sclater, Miss Lilian Sheldon, and A. Willey at different times worked in Sedgwick's laboratory on the development of species from South America, New Zealand, and New Britain. His own last thoughts on the group were only published in 1908 in a paper on its distribution and classification.

The growth of Sedgwick's department at Cambridge and of his broader zoological activities allowed him little subsequent leisure for detailed researches. He twice served on the Council of the Royal Society, and sat for many years on its zoological committees. He was associated with Lankester in the production of the 'Quarterly Journal of Microscopical Science.' He was President of the Zoological Section of the British Association at Dover, and he was consulted not only by his old pupils (with the zoological work of all of whom he kept closely in touch), but by zoologists all over the world.

Occasionally he was stimulated to break out on some question on which he thought zoology in general was going astray. In 1894 he published his views on 'The Significance of Ancestral Rudiments in Embryonic Development,' and at the meeting of the International

Zoological Congress in 1898 he felt compelled to confess his disappointment at the results of embryology in elucidating the question of the origin of species. This speech, coming from the favourite pupil and the successor of Balfour, will probably be found to have had a far wider influence on biological research than has generally been supposed; the younger generation was stimulated to put out tentacles into fresh and little considered avenues, while the elder no longer tried to restrict but rather to encourage them.

Sedgwick's attack "On the Inadequacy of the Cell Theory," and his subsequent reply to his critic, now Prof. G. C. Bourne, met with little favour at the time. He would have nothing to do with that form of the theory which regarded the body of higher animals as a cell-republic, the real vital units being the cells. The writer heard his critics of every nationality at the International Congress of 1898, and no terms of disapproval were too strong for them. He was simply before his time, for the subsequent work of a young band of researchers in developmental mechanics has gone far to confirm his conclusions. He intended to enter the active field of research in support of his views, but he gave up these ideas, as he got no sympathy from those for whom he cared.

In 1884, impelled by a sense of duty to the needs of English-speaking students, he published (with the assistance of F. G. Heathcote) an English translation of Claus' text-book, and in 1896, with the same motive, he resigned active research in order to devote ten years of his life to a further text-book. The result is to be seen in the three volumes that have been published, the largest and most comprehensive English text-book on the subject, and a monument to the author's individual industry. His idea was to give a reasoned narrative about each group, and to make his book at the same time a work of reference by adding some account of each family and genus. Such a scheme was found to be beyond the effort of a single individual, and J. J. Lister and A. E. Shipley were called upon to write that part which relates to the Crustacea, Arachnida, and Insects. The whole was to be completed by a volume on the more philosophical and theoretical parts of the subject, but the exhaustion entailed by Sedgwick's ten years' (1897–1907) tenure of a Tutorship of Trinity in addition to his University work made him disinclined to commence. He actually sketched out a scheme, but he felt that many authors must be concerned, and he dreaded collaboration.

Sedgwick's tenure of the Professorship at Cambridge was too short for him to make any marked changes in the teaching. He was far from well, and he got leave of absence from Cambridge in the Easter Term of 1909 for a prolonged tour round Continental centres of zoology. Then he was persuaded to accept the Chair of Zoology at the Imperial College of Science and Technology. He thought it a duty to his science and to the Empire, but it was a bitter wrench to him to leave his friends and take up life afresh.

The task of creating a department concerned with the economic developments of zoology was not really one after Sedgwick's own heart. He clearly recognized that only the highest possible scientific training, combined with considerably more than average intelligence, is likely to produce capable economic zoologists. He desired to provide advanced economic courses of instruction, which might be used by the graduates of all universities, but he found himself compelled to provide the preliminary adequate scientific training also, thus arousing considerable opposition. He found an admirable coadjutor in his former demonstrator, E. W. MacBride, who gave up his Chair at Montreal to serve under his old master. C. C. Dobell accompanied him from Trinity College as Lecturer on Protozoology, while additional special courses were instituted in Embryology under R. Assheton, Fisheries under Dr. Allen, and Entomology. The last resulted, in 1912, in the foundation of a Professorship of Entomology, the second in the Empire, to which H. M. Lefroy was appointed. Sedgwick whole-heartedly gave the last years of his life to the Imperial College, a foundation to be judged some day by its results. The writer believes that Sedgwick's work in this connection will endure to the advantage of the nation, of the science he loved, and also of kindred institutions.

As a lecturer, Sedgwick was handicapped by a somewhat halting delivery, in strong contrast to the simple vigour and directness of his subject-matter, which was easily understood and appreciated. He showed a delightful sympathy and absence of constraint when dealing with his students; in relation to his staff, he was in theory an autocrat, but in practice a socialist. He believed that a department should be staffed by men, each one of whom should be researching on a different branch of the science. He was curiously averse to the encroachment of the devotees of one biological science on another, but he always recognized that a time would come when all biology would have to be considered as one science—when the debateable border-lines between zoology, physiology, and biochemistry would become the most happy hunting grounds for the combination of researchers from each. Meantime, possibly his very loyalty to the claims of his own subject blinded him to the present possibilities of *rapprochement* with others.

In 1892, Adam Sedgwick married Miss Laura Robinson, daughter of Captain Robinson, of Armagh, by whom he had two sons and a daughter. All survive him, his elder son being a Foundation Scholar of Trinity College.

Of the man himself, a friend can scarcely write dispassionately. His attachment to the memory of Balfour was beautiful. Sedgwick himself had a like gift of inspiring affection which he always reciprocated. He spoke only of the good in his friends, and he felt deeply any change in his relationship to them. He had a quick, vivid, bright personality and a directness and simplicity, infinitely charming. He delighted in bold and comprehensive theories of life and conduct, which were generally right though paradoxical. He was hot-tempered himself, and therefore tolerant of the same trait in others. This impulsiveness of temper and his many eccentricities only served to endear him to his friends, but made it difficult for others to understand him, whose generosity and lovable qualities were often hidden beneath a brusque and somewhat intolerant manner. His failings were, indeed, all upon the surface, and those of us who came into close contact with him are alone qualified to speak of the essential warm-heartedness and candour which made this friend unreplaceable and unforgettable.

J. Stanley Gardiner.

EDITORIAL GLEANINGS.

NATURE RESERVES.

FORMATION OF A NEW SOCIETY.

In his recent address to the Zoological Section of the British Association at Dundee, Dr. Chalmers Mitchell made a strong appeal for the organized preservation of the world's fauna. "It is only by the deliberate and conscious interference of man," he said, "that the evil wrought by man has been arrested"; and, again, "Each generation is the guardian of the existing resources of the world; it has come into a great inheritance, but only as a trustee"—a trustee, that is to say, for generations that are to be. That the larger wild creatures are steadily disappearing from the face of the earth with the advance of civilization needs little demonstration. But coincidently with the wholesale extermination of mammals there is in progress a no less disastrous process of destruction among the lesser creatures—birds, fishes, reptiles, insects, and plants—also of geological remains, and in almost every case this is the result of "the deliberate and conscious interference of man."

To arrest this destructive tendency serious consideration is being given to the subject in many countries. There exist in the United States "reserves" for the vanishing human races; in Norway, Sweden, and North Russia, the Lapps are efficiently protected; in Africa and New Zealand, as elsewhere in the British Dominions beyond the seas, large tracts of land have been fenced off, and laws enacted to prevent the traffic in alcohol and other goods harmful to the primitive races.

THE SOCIETY FOR THE PROMOTION OF NATURE RESERVES.

Elsewhere the duty of maintaining particular phases of human life and of preserving natural objects is recognized and performed by the community as a whole, acting through the State; but in the United Kingdom it has been left to private enterprise and private munificence to establish and finance such refuges and nature reserves as we actually possess. Something has been attempted, it is true, to check the wanton destruction of animal life, by various Acts of Parliament, the arrangement of "close" seasons, sanctuaries, &c.,

and in the National Trust we have a body equipped with the necessary authority to take over and safeguard such gifts of land as may be made by public enterprise or private liberality. Much has already been accomplished in this direction by certain societies and individuals; but all students and lovers of Nature generally are now invited to combine in support of the Society for the Promotion of Nature Reserves.

This society has recently been formed with the following objects:—

1. To collect and collate information as to areas of land in the United Kingdom which retain their primitive conditions and contain rare and local species liable to extinction owing to building, drainage, and disafforestation, or in consequence of the cupidity of collectors. All such information to be treated as strictly confidential.

2. To prepare a scheme showing which areas should be secured.

3. To obtain these areas and hand them over to the National Trust under such conditions as may be necessary.

4. To preserve for posterity as a national possession some part at least of our native land, its fauna, flora, and geological features.

5. To encourage the love of Nature, and to educate public opinion to a better knowledge of the value of Nature study.

The society exacts no subscription; members are formally elected by invitation of the Executive Committee (marked with * below), and all interested are invited to communicate with the secretaries. The control of the society's affairs is in the hands of a representative council consisting at present of the following:—

President, the Right Hon. J. W. Lowther, M.P. Dr. I. Bayley Balfour, F.R.S., Sir Edward H. Busk, Sir Francis Darwin, F.R.S., Dr. F. D. Drewitt, *G. Claridge Druce, Professor J. Bretland Farmer, F.R.S., L. Fletcher, F.R.S., the Right Hon. Sir Edward Grey, Bt., K.G., M.P., the Right Hon. L. V. Harcourt, M.P., *Sir Robert Hunter, K.C.B., Lord Lucas, *E. G. B. Meade-Waldo, *the Hon. E. S. Montagu, M.P., the Earl of Plymouth, C.B., Professor E. B. Poulton, F.R.S., Sir David Prain, F.R.S., *the Hon. N. C. Rothschild, *W. H. St. Quintin, Dr. R. F. Scharff, W. M. Webb. *Ex-officio*: Hon. Treasurer, *C. E. Fagan, I.S.O.; Hon. Secretaries, *W. R. Ogilvie-Grant and *the Hon. F. R. Henley.

The Trustees of the British Museum have kindly given permission to the committee to use the Natural History Museum, Cromwell Road, London, S.W., as the temporary address of the society.

To carry out the objects of the society prompt action must be taken, for year by year suitable areas become fewer; and local plants and insects are found to have been extirpated when the acquisition of a few acres of land would have saved them. Such land is often unsuitable for other purposes; an isolated spot on Government property, a piece of marshland, a bird-haunted cliff, or a stretch of wood and copse where the undergrowth has been allowed to follow its own devices are admirable subjects for Nature reserves. Above all, it is essential that the land selected or reserved should as far as possible retain its primitive wildness. Such lands still exist in the United Kingdom, though each year they become more rare, and once deprived of their indigenous occupants they can never be restored to a natural state. It should be borne in mind, that if in the course of time, owing to the growth of a city, or for some other reason, a nature reserve has ceased to serve its purpose, the ground would still be valuable as an open space.

FOREIGN NATURE RESERVES.

On the Continent, as already observed, the importance of nature reserves has been widely recognized. In Germany, particularly, a large amount of land has been reclaimed, and in a recently published book, Herr H. Conwentz, Prussian State Commissioner for the Care of Natural Monuments, gives a detailed account of the work done in several States of the Empire. Bavaria, more than a hundred years ago, bought up the Bamberg suburban woods, afterwards forbidding indiscriminate forestry, and ordering the foresters to preserve and catalogue the chief natural features. Later, a general committee composed of delegates from the municipality and from local and artistic societies have been exceptionally successful in securing wild "parks" for rare plants. In Hessen and Oldenburg special attention has been paid to the preservation of primeval forest land; while in the first years of the new century Prussia began to recognize the necessity of protecting nature reserves, and these have since been regularly registered and mapped, Parliament, the Educational Department, and the Department of Agriculture and Domains acting conjointly to assist the movement. Thus, Memmert, an uninhabited island between Juist and Borkum in the German Ocean, is now reserved as a bird sanctuary, with a watcher to look after it during the breeding season; and a tract of salt marsh near Artern perpetuates the plant association of the locality. Elsewhere spots especially favoured by wild nature have been similarly secured; for example, the Prussian Government, the local authorities and societies, and private individuals have all co-operated to secure the forest district of Chorin, near Berlin, including fenland and a small lake, also a tract of forest in the Hartz Mountains. Saxony has followed this example. In Holland, the Naardermeer, in the south of the Zuider Zee, with its rich avifauna, is now effectively isolated, while in Sweden immense stretches of country in the far north and elsewhere have been closed to the collector, not before it was necessary. It is common knowledge that before the reservation of the magnificent Lapland country round the *Torneå Träsk*, and simultaneously with the opening of the Baltic-Atlantic railway, the district was ruthlessly over-collected by dealers and others; in one summer a single individual is credited with the removal of 10,000 plants. In Hungary there are several reserved areas; one of them at Puszta-Pészer, in the Pest Comitat. In France good work has been done by the Forest Board in the protection of undergrowth and by some local prohibitions in the departments of Isère and Savoie on behalf of a few Alpine plants. Much the same may be said of Switzerland, where a few Cantons have issued edicts against the destruction of edelweiss and other "threatened" flowers. In Belgium, though at present little has been done officially in the way of protection, the Royal Botanical Society has completed an admirable survey of desirable natural sites ("Pour la Protection de la Nature en Belgique." Jean Massart, 1912), and this work has aroused general public interest.

In the United States, where it is obvious that the conditions are entirely different as far as the acquisition of primitive land is concerned, the system of "National Parks" has been inaugurated, but unfortunately too late to save a large part of the indigenous fauna. Canada, Australia, New Zealand, and South Africa have set the Mother Country a splendid example of what can be done in this direction. In England, where space is limited and the population numerous, a beginning has been made by the acquisition for the nation of a part of Wicken Fen, in Cambridgeshire, the shingle and salt-marshes of Blakeney, in Norfolk, and the "Ruskin Reserve" near Oxford: all these retain their primitive character. Much more remains to be done, and it is hoped that the "Society for the Promotion of Nature Reserves" will meet with wide and sympathetic support.—(Reprinted from the 'Times.')

BRITISH 3 APR 13 MUSEUM